SIMULTANEOUS VIEWING OF TIME DIVIDED SEGMENTS OF A TV PROGRAM

TECHNICAL FIELD OF THE INVENTION

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The present invention is directed, in general, to viewing stored video content and, more specifically, to nonlinear viewing of video content such as concurrent viewing of multiple segments.

BACKGROUND OF THE INVENTION

Video programs may be stored in a personal video recorder (PVR) or video cassette recorder (VCR) and then later retrieved for viewing at any time. Similarly, the content stored on a digital versatile disk (DVD) may be retrieving for viewing at any time. In either instance, the stored content may be viewed in many ways, the most common of which is in "one dimension"--that is, linearly from start to end in the regular manner in which the content was intended to be viewed, with possible fast-forwarding (or fast "rewinding") through or past selected scenes. Digital versatile disks add the ability to begin viewing the content at any of a number of intermediate

break points ("chapters"), but are still limited to one-dimensional, linear viewing from such break points.

Contemporary viewers are increasingly sophisticated, and may not be satisfied if limited to conventional one-dimensional viewing of video content. Concurrent viewing or display of noncontiguous scenes within video content may be desired by such users for reasons such as comparison or artistic analysis. Additionally, fast location of particular scenes within the video content may be desirable for a variety of reasons such as copying for incorporation into another video work or exclusion from an edited version of the stored video content (e.g., removal of commercial advertisements).

There is, therefore, a need in the art for improved, nonlinear display of stored video content in a flexible manner allowing multiple segments to be concurrently displayed.

SUMMARY OF THE INVENTION

To address the above-discussed deficiencies of the prior art, it is a primary object of the present invention to provide, for use in a video system, a controller dividing a single video program into multiple segments, with at least one frame from each segment concurrently displayed each within a different display portion of a total display area. The segments may be concurrently played within the different display areas to permit quick location of particular scenes. The number of segments, the length of uniform segments, or the number of segments and their corresponding lengths may be varied by the user. User controls also permit selection or modification of particular segments during concurrent displays.

The foregoing has outlined rather broadly the features and technical advantages of the present invention so that those skilled in the art may better understand the detailed description of the invention that follows. Additional features and advantages of the invention will be described hereinafter that form the subject of the claims of the invention. Those skilled in the art will appreciate that they may readily use the conception and the specific embodiment disclosed as a basis for modifying or designing

other structures for carrying out the same purposes of the

present invention.   Those skilled in the art will also

realize that such equivalent constructions do not depart

from the spirit and scope of the invention in its broadest

5   form.

Before undertaking the DETAILED DESCRIPTION OF THE

INVENTION below, it may be advantageous to set forth

definitions of certain words or phrases used throughout

this patent document: the terms "include" and "comprise,"

10   as well as derivatives thereof, mean inclusion without

limitation; the term "or" is inclusive, meaning and/or; the

phrases "associated with" and "associated therewith," as

well as derivatives thereof, may mean to include, be

included within, interconnect with, contain, be contained

15   within, connect to or with, couple to or with, be

communicable with, cooperate with, interleave, juxtapose,

be proximate to, be bound to or with, have, have a property

of, or the like; and the term "controller" means any

device, system or part thereof that controls at least one

20   operation, whether such a device is implemented in

hardware, firmware, software or some combination of at

least two of the same.   It should be noted that the

functionality associated with any particular controller may

be centralized or distributed, whether locally or remotely.

Definitions for certain words and phrases are provided throughout this patent document, and those of ordinary skill in the art will understand that such definitions apply in many, if not most, instances to prior as well as future uses of such defined words and phrases.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present

invention, and the advantages thereof, reference is now

5   made to the following descriptions taken in conjunction

with the accompanying drawings, wherein like numbers

designate like objects, and in which:

FIGURE 1 depicts a video system supporting concurrent

display of time divided video segments from a single piece

10   of video content according to one embodiment of the present

invention;

FIGURES 2A through 2D illustrate concurrent displays

of time divided video segments from a single piece of video

content according to one embodiment of the present

15   invention; and

FIGURE 3 is a high level flow chart for a process of

concurrently displaying time divided video segments from a

single piece of video content according to one embodiment

of the present invention.

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DETAILED DESCRIPTION OF THE INVENTION

FIGURES 1 through 3, discussed below, and the various
embodiments used to describe the principles of the present
5   invention in this patent document are by way of
illustration only and should not be construed in any way to
limit the scope of the invention. Those skilled in the art
will understand that the principles of the present
invention may be implemented in any suitably arranged
10   device.

FIGURE 1 depicts a video system supporting concurrent
display of time divided video segments from a single piece
of video content according to one embodiment of the present
invention. Video system 100 may be implemented within or
comprise a video receiver such as a satellite, terrestrial
or cable broadcast television receiver or a set-top box, a
video recording and/or playback device such as a video
cassette recorder, digital video recorder or digital
versatile disk player, or some combination of such devices.

20   Video system 100 includes a controller 101 having an
input 102 for receiving control signals such a infrared
remote control signals. Controller 101 is coupled to a
memory 102 or other storage (e.g., a hard disk drive or
digital versatile disk drive and disk), which may

optionally be disposed within a separate device from controller 101. Controller 101 also includes a display 103 in the exemplary embodiment, although controller 101 may include an output connection (not shown) to a separate

5   device having a display in lieu of, or in addition to, the display 103.

Controller 101 includes at least on video decoder and/or player 104a, and may include up to n (where n is any positive integer) video decoders/players 104a-104n.

10   Storage 102 contains one or more items of video content 105, such stored programs demodulated and recorded from a broadcast or a Motion Pictures Expert Group (MPEG) encoded program on a digital versatile disk. Storage 102 may also optionally contain a set of user preferences 105 regarding

15   display of video content in accordance with the present invention, as described in further detail below.

FIGURES 2A through 2D illustrate concurrent displays of time divided video segments from a single piece of video content according to one embodiment of the present

20   invention, and are intended to be read in conjunction with FIGURE 1. With the present invention, controller 101 enables two-dimensional viewing of video content wherein various different segments from a single item of video content are concurrently displayed.

For example, a ninety minute video program, depicted in FIGURE 2A as a sequence of fields or frames, may be divided by controller 101 into six sequential segments 200-205 as shown in FIGURE 2A, each 15 minutes long, with the

5   first field or frame for each segment 200-205 marked with an alphabetic letter. Controller 101 locates the beginning of each segment (in a memory or on a hard disk, digital versatile disk, or video tape), then creates six windows within the viewable display area and displays at least a

10   first frame or field from each of the six segments 200-205, one in each window as shown in FIGURE 2B.

Controller 101 may display either a single field or frame from each segment as a still image, or may concurrently play each segment within the respective

15   windows utilizing one decoder/player 104a-104n for each window. If only a single decoder/player is available, multiplexing may be employed, either to maintain play of all six segments if possible or to alternately play one video segment in sequence for a period of time before

20   playing the next video segment. The frame in each window should be updated once every $1/30^{th}$ of a second to provide simultaneous play of multiple segments.

Where multiple segments are concurrently played, a single audio track associated with one of the segments may

be played, or audio tracks from two segments may be concurrently played on left and right audio channels.

Concurrent display of different segments from a single video program allows the viewer to quickly locate portions of interest or, alternatively, "boring" or uninteresting portions such as commercials. Once interesting portions are identified, the viewer can quickly focus on such segments by zooming in those segments on and replaying them in the full display area as shown in FIGURE 2C (where segment 203 has been selected and "zoomed in" on by the user), with the remaining segments removed. Similarly, uninteresting portions may be marked for skipping during subsequent replays or copying of the video program.

Other display configurations may be supported by controller 101, such as the full area display with small, overlying insets illustrated in FIGURE 2D, where one segment is played (or represented by a still image) in the full area display and the remaining segments played or represented by a still image in each of the insets, in the manner of a picture-in-picture (PIP) display. The viewer may switch between the views of FIGURES 2B and 2D, and swap the segment displayed in the full area display with a segment displayed in an inset.

Alternatively, where the display area is equally divided for each segment, one or more segments may be removed from the display to allow the remaining windows to have more space within the display area. The full display area may also be utilized, with the segment displayed alternating cyclically through the available segments 200-205 in a periodic, round-robin manner.

When concurrently displayed, segments 200-205 may be played in either forward or reverse, paused or "frozen" to a still image to be restarted later. Control actions such as fast-forward, fast-reverse, or pause may operate on all segments identically, or may operate only on individual, selected segments. Two or more selected (contiguous or noncontiguous) segments may be combined or merged into a single segment, which continues playing after the remaining segments have ended. One selected segment (or all segments 200-205) may be further subdivided into smaller segments, which are then displayed.

Moreover, while the video program is divided into six, uniformly sized segments in the exemplary embodiment, any positive integer number of segments may be created, and the sizes need not be uniform. In this regard, the user preferences 105 may specify the number of segments and/or the length of segments (either the length of equal size

segments into which the video program should be divided or the length of each of a defined number of segments). For instance, in editing a video program to remove commercial advertisements, the video program may be segmented in a

5   fashion most likely to enable quick identification of the commercials (e.g., segments selected to start near portions of the video program likely to contains commercials). Edits to one video program may be utilized to create a template for segmenting other video programs of a similar

10   type.

FIGURE 3 is a high level flow chart for a process of concurrently displaying time divided video segments from a single piece of video content according to one embodiment of the present invention. The process 300, executed within

15   controller 101 in FIGURE 1, begins with concurrent display of time-divided segments from a selected video program being initiated (step 301).

The number of segments, the length of each segment, or the number of segments and associated lengths of each

20   segment is first determined and the selected video program divided into the appropriate segments (step 302). Display areas for each segment are then formed within the total display area, and at least one frame from each segment is displayed in the corresponding display area (step 303).

The process then monitors for user controls (step 304) such as stop, pause, resume, zoom, etc., and implements the appropriate action when a user control is detected (step 305). The process continues until interrupted or terminated by an external process.

Referring once again to FIGURE 1, where storage 102 is located within a device separate from controller 101 (e.g., one or more video players), controller 101 should include an interface to the video player to inform the video player(s) of the locations and lengths of segments to be player, as well as to communicate control signals to stop and resume the player(s).

The present invention enables two-dimensional viewing of video content for quick location of particular scenes therein, or for other purposes. Segmentation of a video program for concurrent display of different segments, either discrete or overlapping, allows greater flexibility to video program viewing.

It is important to note that while the present invention has been described in the context of a fully functional system, those skilled in the art will appreciate that at least portions of the mechanism of the present invention are capable of being distributed in the form of a machine usable medium containing instructions in a variety

of forms, and that the present invention applies equally regardless of the particular type of signal bearing medium utilized to actually carry out the distribution.   Examples of machine usable mediums include: nonvolatile, hard-coded

5   type mediums such as read only memories (ROMs) or erasable, electrically programmable read only memories (EEPROMs), recordable type mediums such as floppy disks, hard disk drives and compact disc read only memories (CD-ROMs) or digital versatile discs (DVDs), and transmission type

10   mediums such as digital and analog communication links.

Although the present invention has been described in detail, those skilled in the art will understand that various changes, substitutions, variations, enhancements, nuances, gradations, lesser forms, alterations, revisions,

15   improvements and knock-offs of the invention disclosed herein may be made without departing from the spirit and scope of the invention in its broadest form.